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AUTHOR Finch, Curtis; Kelly, Patricia; Heath-Camp, Betty; Harris, Jerilyn; Zimmerlin, Daniel; Aragon, Steven

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ABSTRACT

The 1990 Perkins Amendments and the 1994 School-to-Work Opportunities Act encouraged high schools and community colleges to combine academic with vocational curriculum in a program that includes work-related applications and creates clearer pathways from secondary to postsecondary education. To ensure the readiness of educators, institutions that prepare teachers must reshape their programs. Three programs were redesigned in response to this need. Two programs are those that prepare high school teachers at the University of California, Berkeley, and at Virginia Polytechnic Institute and State University. The third program is a teacher education program for community college instructors at the University of Illinois at Urbana-Champaign. The three initiatives seem to align with contemporary views of organizational renewal--collaborative reflection, culture of inquiry, and individual and organizational renewal. Based on study of these three programs, the following recommendations were made: (1) expect and plan for a large, complex reform process; (2) organize for change in the long term; (3) involve stakeholders as collaborating, contributing partners; (4) establish stakeholder ownership in the reform; (5) provide stakeholders with opportunities to engage in inquiry; and (6) employ team building processes throughout the reform process. (Contains 24 references.) (KC)

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NCRVE

National Center for Research in Vocational Education

University of California, Berkeley

Reforming Preservice Preparation Programs for Secondary and Postsecondary Instructors

Curtis Finch
Patricia Kelly
Betty Heath-Camp
Virginia Polytechnic Institute and State University

Jerilyn Harris
Daniel Zimmerlin
University of California, Berkeley

Steven Aragon
University of Illinois at Urbana-Champaign

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University of Illinois at Urbana-Champaign

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National Center for Research in Vocational Education
University of California, Berkeley
2030 Addison Street, Suite 500
Berkeley, CA 94720-1674

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Executive Summary

The 1990 Perkins Amendments and the 1994 School-to-Work Opportunities Act encouraged high schools and community colleges to combine academic with vocational curriculum in a program of study that included work-related applications and created clearer pathways from secondary to postsecondary education. Thousands of high schools and community colleges have now implemented some form of career academies, clusters, majors, Tech Prep, or a combination of these approaches. The result is a greater demand for teachers with new capabilities. Foremost among these is facility at integrating academic and vocational studies, coordinating school- and work-based learning, and articulating secondary and postsecondary studies. Teachers employed in these comprehensive reform settings are often expected to integrate, coordinate, and articulate on a regular basis.

Meeting the demand for instructional staff who can perform these new functions will require changes in preservice education. Unfortunately, teacher preparation programs have scarcely recognized the changes that are occurring in high schools and community colleges (Finch, 1998). New teachers are not being well-prepared to combine academic and vocational curriculum, supervise students in community-based learning, or offer courses of study that prepare students both for work and for further education. Institutions that educate teachers and other instructional staff are faced with new demands for people who are equipped to work in high school and community colleges where integrating academic and vocational curricula, using work-based learning in the instructional program, and articulating secondary and postsecondary studies are commonplace. To ensure the readiness of educators, institutions that prepare educators must reshape their programs.

The Initiatives

In response to this need, three universities in the NCRVE consortium decided to redesign their teacher education programs. Descriptions are provided about the redesign of preservice teacher education programs for high school teachers at two of the NCRVE consortium universities—University of California, Berkeley (UC Berkeley) and Virginia Polytechnic Institute and State University (Virginia Tech). In addition, the redesign of a teacher education program for community college instructors at the University of Illinois at Urbana-Champaign (UIUC) is documented. In its own way, each of the universities has begun creating a reform process that focuses on preparing teachers to integrate academic and vocational studies,

coordinate school- and work-based learning, and articulate secondary and postsecondary studies.

Implications

What has been learned from these three initiatives? Do they have implications for others who are planning to reform their teacher education programs? To answer these questions, a close look must be taken at collaborative inquiry, a process that promotes a climate in which people become engaged in understanding the need for change, actively study the change and decide how it will occur, and then participate in implementing the change. Osguthorpe (1999, pp. 16-18) offers a comprehensive model for individual and organizational renewal that builds on contemporary collaboration and inquiry literature. In this model, collaborative reflection serves as the starting point for establishing a culture of inquiry, and a culture of inquiry provides a foundation for both individual and organizational renewal.

Connections with Organizational Renewal

In fact, the three initiatives seem to align quite well with contemporary views of organizational renewal. This alignment can be described in the context of three aspects of organizational renewal: (1) collaborative reflection, (2) culture of inquiry, and (3) individual and organizational renewal.

Collaborative Reflection

In their own way, each of the initiatives involved a wide range of stakeholders in collaborative reflection. At a 1998 conference sponsored by Virginia Tech project staff, university teacher educators, preservice teachers, and practicing teachers and administrators in the schools were afforded an opportunity to meet together, share concerns about the schools and teacher education, and establish a more meaningful direction for change in university teacher education. The outcomes of this conference served as a foundation for work conducted during 1999. At UC Berkeley, part of the 1998 initiative agenda focused on bringing university teacher educators and teachers from local career academies together to discuss academy teaching issues and explore collaboratively the activities that might be included in preservice teacher education to better meet the needs of the schools. This list of potential activities formed the basis for UC Berkeley's 1999 agenda. At UIUC, concerns about the preparation of community college instructors led to a collaboration with three community colleges that were actively engaged in curriculum and instructional reform. Through focus groups conducted with faculty members and administrators at these

institutions, valuable information about current and future community college instructor needs was obtained. Much of the information gathered was incorporated into a program for community college educators and is already having a direct impact on how instructors are prepared.

The initiatives have also maintained their collaborative relationships with stakeholders. Educators from outside the universities continue to be involved in collaborative reflection with university faculty. For example, at UC Berkeley, a series of workshops for student teachers were presented during the Fall of 1999 by a team of teachers from career academies. The workshops were designed collaboratively by academy teachers and teacher education staff at UC Berkeley. At UIUC, a meeting during the Fall of 1999 provided an opportunity to gain more insight into trends in community college teaching and learning as well as the professional development needs of persons seeking careers in community college teaching. Participating in this collaborative meeting were community college instructors, supervisors, and administrators, as well as a representative from the Illinois Community College Board. Virginia Tech initiative staff scheduled a meeting that brought together university teacher educators, school administrators, and teachers to reflect on past collaboration and make plans for collaboration in the future. Many of the ways that collaborative reflection can be stimulated have been incorporated in the initiatives' activities. Examples include building trust, making time to collaborate, nurturing questions, forming groups, and taking risks. Additionally, the patience displayed by collaborators reflects a perception that reforming teacher education cannot be accomplished overnight. It is viewed as a long-term initiative; one that cannot be rushed.

Culture of Inquiry

The initiatives appeared to incorporate cultures of inquiry into their efforts. Building cultures of inquiry into the three reform agendas may have been stimulated by the strong commitment of all three research universities to conducting disciplined inquiry. A culture of inquiry could be seen at UIUC when community college focus group results were incorporated into a course for community college educators. In this instance, there was not only concern about the revised course's process (e.g., how it was organized and flowed) but also about its outcomes (e.g., how students reacted to the course and how what they learned was applied to community college settings). Inquiry was also noted at Virginia Tech where teams of educators—teacher educators, teachers, and student teachers—collaborated to determine the best ways of integrating academic and vocational studies into different school subjects and settings. At UC Berkeley, a culture of inquiry was established through testing several approaches to providing student teachers with experiences in workplaces and schools. Feedback

from students who participated in these experiences helped to guide future decisions about the approaches.

Individual and Organizational Renewal

It is difficult, if not impossible, to determine whether the initiatives have resulted in individual and organizational renewal. There is, however, some indication that the three initiatives are moving in the right direction. Evidence that university teacher educators and educators in schools and community colleges are working together in collaborative and reflective ways supports the notion that teacher education renewal is moving forward. Likewise, inquiry processes incorporated into the initiatives include active participation and involvement from school and community college educators. This is a major shift from the way change has occurred traditionally in teacher education programs. A revolutionary shift such as this is just what may be needed to stimulate real renewal in teacher education at the university level.

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Introduction

During the 1990s, many high schools and community colleges have made sweeping changes in their instructional programs (Olson, 1997; Urquiola et al., 1997; Visher, Lauen, Merola, & Medrich, 1998). These changes have been prompted by a widespread sense that traditional methods are not working for many students. The 1990 Perkins Amendments and the 1994 School-to-Work Opportunities Act encouraged high schools and community colleges to combine academic with vocational curriculum in a program of study that included work-related applications and created clearer pathways from secondary to postsecondary education. Thousands of high schools and community colleges have now implemented some form of career academies, clusters, majors, Tech Prep, or a combination of these approaches.

The result is a greater demand for teachers with new capabilities. Foremost among these is facility at integrating academic and vocational studies, coordinating school- and work-based learning, and articulating secondary and postsecondary studies. Examples of settings where demand for teachers with these new capabilities is most urgent include California's career academies that are located in hundreds of high schools across the state; the 800 high schools that are members of the Southern Regional Education Board's *High Schools That Work* consortium; and numerous community colleges across the United States that are involved with integration, work-based learning, and Tech Prep efforts. Teachers employed in these comprehensive reform settings are often expected to integrate, coordinate, and articulate on a regular basis.

Meeting the demand for instructional staff who can perform these new functions will require changes in preservice education. Unfortunately, teacher preparation programs have scarcely recognized the changes that are occurring in high schools and community colleges (Finch, 1998). New teachers are not being well-prepared to combine academic and vocational curriculum, supervise students in community-based learning, or offer courses of study that prepare students both for work and for further education.

The purpose of this effort, therefore, was to engage educators of instructional staff at selected NCRVE institutions in designing and implementing new strategies that prepare new staff members for employment in high schools or community colleges which emphasize both further education and careers. This report describes the paths followed by three institutions as they began initiating reform in their teacher education programs. Since each university had different clients and chose a somewhat different path in its pursuit of reform, the three descriptions of what occurred reflect a range of contexts, clients, and processes. The institutions'

efforts have been documented so those interested in conducting teacher education reform may learn what others have experienced when initiating change in their programs.

Linkage to the Framework Part of the Overall Project

This effort was one of two included in an overall project directed by NCRVE to address the redesign of staff development for high schools and community colleges in light of educational reform demands. The part of the overall project that is described here was designed to continue and strategically expand (adding attention to the community college setting) the work of several universities in the NCRVE consortium toward redesigning their preservice teacher education programs. The other part, which is described in another report, *New Designs for Staffing and Staff Development for Secondary and Postsecondary Education* (MDS-1312), focused on developing a conceptual framework to give greater coherence and depth to the redesign of staff development programs. These two project activities have been linked so as to inform each other and improve their mutual contribution to the field.

The two project activities have informed each other to their mutual benefit. This part of the project provides insight into and lessons from the challenges and opportunities in the redesign of an important segment of staff development for high schools and community colleges—the preservice teacher education program. The other part of the project is grounded in the context and realities of present staff development structures, organization, processes, and policies. At the same time, that part of the project provides insight and lessons from new and significantly advanced designs for the operation of high schools and community colleges. The framework part of the project has been grounded in the future—on the staffing and staff development needs when breaking rank with traditional ways of operating high schools and community colleges. In Senge's (1990) language of the learning organization, the two parts of the project together provide a sense of vision, present reality, and offer ways to confront and reduce the creative tension between the areas to which they relate in the preparation of instructional staff.

Earlier Teacher Education Activities

The current redesign efforts build on ten years of NCRVE research and development related to teacher education. From this long-term R&D foundation, NCRVE initiated a major teacher education initiative in 1997, focusing on inservice education programs for teachers. Then, beginning in 1998, the teacher education initiative expanded to engage several NCRVE

teacher education institutions in redesigning their preservice teacher education programs. These 1998 redesign initiatives are introduced below:

Virginia Polytechnic Institute and State University (Virginia Tech) has been faced with a demand for new teachers to work in high schools that have embraced the integrated academic-vocational approach of *High Schools That Work* (*HSTW*). In 1998, NCRVE support was used to bring teacher education faculty and students together with faculty from nearby high schools. Specifically, teacher education faculty and students came from Vocational Education (Business, Marketing, Family and Consumer Sciences, and Vocational Industrial Education), English, and Science Education. Preservice teachers, practicing teachers, and university faculty gathered to share and learn ways to address the Virginia Standards of Learning (SOLs) in an integrated curriculum process. Four Virginia high schools were involved: William Byrd High School, a well-established *HSTW* school, which has strong administrative support and enthusiastic activity from about half of the faculty; Salem High School, another well-established *HSTW* school, in which faculty are required to demonstrate how they are integrating curriculum and addressing work-related skills; Cave Spring High School, a new *HSTW* school, which has support from administration and faculty and is emerging at this point; and Arnold R. Burton Vocational-Technical School, which houses students from some of the other participating schools in the project and has been involved with them through *HSTW*.

Conference attendees were from all academic content areas, vocational-technical areas, administration, guidance, and special education. Teachers showcased projects that they had developed involving a number of other curriculum areas and teachers as a way of integrating curriculum and teaching specific SOLs in meaningful, work-related contexts. During a workshop portion of the conference, teams comprised of preservice teachers, inservice teachers, and university faculty were given a set of SOLs for which they developed an integrated project. Each team of six to eight had a mix of attendees because a major goal of the conference was to give preservice teachers the opportunity to work closely with a group of practicing teachers as they addressed a critical school problem. Additional goals were to bring practicing teachers into the teacher preparation process at stages other than the field experience, to help them see that they are an integral part of Virginia Tech's teacher preparation program, and to provide a forum for practicing teachers to share ideas and develop new approaches. The 1998 effort has demonstrated to those involved the value of collaboration across teacher education teaching areas as well as across preservice education and inservice development. Additional results include the strengthening of professional links between teacher educators in academic and vocational teaching areas as well as links with educators in the public schools, and with aspiring and practicing teachers.

University of California, Berkeley (UC Berkeley) is facing a demand for new teachers who are prepared to work in a growing number of career academies and other settings in which the college-and-career approach is being used to improve the educational performance of California's large and growing linguistic minority student population, and to raise the academic performance of all students, particularly in math and science. UC Berkeley offers two preservice teacher education programs at the secondary level: one leading to a single-subject teaching credential in English with a Crosscultural, Language, and Academic Development (CLAD) emphasis, and one leading to a Master's and credential in science and math education (MACSME). California has been a pioneer in the development of career academies—small learning communities in high schools where students and teachers stay together for several years, and curriculum is designed to prepare for both college and work—which have been found to help students improve their academic performance, finish high school, and go on to college (Stern, Raby, & Dayton, 1992). California high schools contained approximately 500 career academies as of 1998, and they were especially common in the San Francisco Bay Area, where one large school district (Oakland) was in the process of developing enough career academies so that every student in 10th-12th grades could enroll in one. Secondary teacher educators at Berkeley are therefore interested in career academies and how they can prepare new teachers to work in them. In July 1998, NCRVE support allowed experienced academy teachers in English, science, and mathematics to join coordinators and student teacher supervisors from CLAD and the MACSME programs in a three-day seminar at UC Berkeley. After describing their programs, participants discussed what teachers in academy settings need to know how to do, and be willing to do, in order to successfully teach in an academy, as well as how that is different from "regular" classroom teaching. Ways to prepare teachers for academy settings, barring financial, logistical, or other constraints, were documented and narrowed to those that were attainable in the near future. A comparison of current practice with feasible future practice led to suggestions for new mechanisms and strategies to incorporate learning-in-context and school-to-career reform principles into the CLAD and MACSME teacher preparation programs.

The **University of Wisconsin** (UW Madison) redesign initiative focused on improvements in the Family and Consumer Science (FCS) Teacher Education Program, which is housed in the School of Human Ecology. Several important new connections have being addressed by the project. To illustrate the importance of academic knowledge in the workplace, project staff are working to provide prospective FCS teachers with increased opportunities to observe technology intensive workplaces. In addition, they are establishing closer affiliations between the program and local Tech Prep and school-to-work efforts. Also, the recently released core academic

learning standards will be reviewed and integrated within the FCS program design. It is anticipated that substantial changes will be made in the following core courses: Program Planning, Pre-Student Teaching, and Student Teaching. Two other related initiatives are underway in Wisconsin that could substantially influence and support the redesign of teacher education. These include the University System's Competency-Based Admissions policy, which permits students to gain college admission based on teachers' assessments of their performance on core academic competencies, and UW Madison's Education and Work Leadership Program. The latter is being implemented with eight school-based teams of instructors and administrators developing and conducting collaborative action research aimed at improving school-to-work practices.

1999 Activities: An Overview

Activities completed during 1998 were productive and have already led to some new activities at Virginia Tech and UC Berkeley. However, these activities were mainly limited to promoting awareness on the part of teacher educators and their student teachers about career academies and *High Schools That Work*.

In 1999, focus has been on the further development, implementation, and description of the redesign of preservice teacher education at three NCRVE institutions: Virginia Tech, UC Berkeley, and the University of Illinois at Urbana-Champaign (UIUC). Collectively, the three institutions have opportunities to advance new approaches to teacher education that focus more directly on integrating academic and vocational studies, coordinating school- and work-based learning, and articulating secondary and postsecondary studies. Virginia Tech has several ongoing linkages with high schools that are members of *HSTW*, and teacher educators at UC Berkeley have already established meaningful linkages with several high schools that house career academies. The UIUC has joined the group for 1999 because of its strong connections with community colleges that are engaged in comprehensive educational reform.

Detailed information about 1999 activities for each of the three initiatives is presented in the sections that follow. Project staff for each initiative first describe the context for their efforts and the relevant earlier work that has been accomplished. What was expected to be achieved through the initiative is then detailed. Initiative activities are described, and the results of these activities are discussed. Several lessons learned from the experiences are then shared. In a final section of the report, implications drawn from the three initiatives are presented.

Changing the Teacher Education Culture: A School-Based Approach to Reform

Context

Generally, the context for teacher education at Virginia Tech reflects the situation in most schools or departments of teacher education. If collaboration and integration occurs, such initiatives are more likely to be between those academic disciplines that are historically aligned—math/science and English/social studies. Collaborative initiatives among vocational and academic disciplines are sporadic at best. Similarly, the picture for student teachers mirrors the university and public school environments. Student teachers move from departmentalized university settings to departmental school settings. Even in schools actively engaged with *High Schools That Work* (*HSTW*) or Tech Prep programs, collaborative efforts to integrate curriculum are frequently viewed as "events" rather than a natural way of viewing teaching and learning.

This general lack of collaboration, not unique to Virginia Tech, as well as a statewide initiative affecting teacher education programs throughout Virginia—the Virginia Standards of Learning (SOLs)—served as a catalyst for the initiative described in this report. The SOLs are rigorous new standards in the four academic areas of English (literature/reading and writing), social studies (American history and government), science (biology, chemistry, and physics), and mathematics (Algebra I and II, geometry, and calculus). Students must attain a designated number of "certified" credits, indicating they have passed the state exams for the courses as well as the courses themselves. Schools must have 70% of their students passing the tests or they will lose accreditation. Needless to say, teachers and administrators are highly concerned. Their concerns have begun to be reflected in student teacher placements in that, in many schools, student teachers cannot be placed in classes in which the tests are mandated. Therefore, this felt need for collaboration as well as the impact of the newly mandated standards and tests on student teacher placements provided the impetus to start the dialogue about how to integrate academic and vocational skills across the curriculum and to teach skills in contexts that have real-world applications.

The first step toward starting the dialogue among the three constituencies was to hold a "Team Building for Integration of High School Academics and Vocational Education Conference." At that conference, teachers from three *HSTW* programs, preservice teachers, and Virginia Tech teacher

educators first revisited the theoretical bases for integrating curriculum. The integration "models" undergirding the project were two of the eight identified by Grubb, Davis, Lum, Plihal, and Morgaine (1991): (1) the infusion of academic content into vocational courses by combinations of vocational and academic teachers and (2) the use of vocational applications to illustrate concepts and principles within academic courses. During the conference, teachers reported on projects from their schools, brought displays and examples of student work, and discussed the processes that were used to draw in as many different content teachers as possible. During the second half of the conference, teams comprised of teachers and preservice teachers from vocational and academic areas developed projects that could be carried out in schools. To assist the team planning process, materials were distributed that delineated the integration of SOL core subjects' objectives across the curriculum in both academic and vocational subjects. There were three results from the conference: (1) teachers' sharing of projects helped not only the preservice teachers see possibilities for how academic and vocational teachers can work together but also sparked ideas for other school site projects; (2) preservice teachers experienced the team planning process for new integrated curriculum projects with teachers from other content areas; and (3) the foundation for better communication across all content areas was established.

Consequently, the current effort built upon the work already accomplished and addressed two other issues as well. The first issue centered on changing the perception of school cultures that departmentalize teachers and instruction by increasing the opportunities for preservice teachers to work together in cross-curriculum situations and to connect with other teachers during their student teaching placements. Schmidt, Finch, and Faulkner (1992) found six themes in vocational and academic integration activities. Two of them—vocational and academic collaboration and building integrated curricula—provided the basis for supporting preservice teachers' efforts to collaboratively design integrated projects with other teachers in their schools. The second issue focused on providing a way to distribute information about successful integrated curriculum projects that were developed and carried out by both classroom and preservice teachers.

Objectives

Because we wanted to build into the teacher preparation program an emphasis on vocational and academic collaboration and creating integrated curricula, the first objective of the project was to develop a system to encourage that process. To this end, a mini-grant proposal process for student teachers during spring semester 1999 was established. Through this mini-grant process we sought to answer three major questions:

(1) Would the mini-grant process encourage student teachers to collaborate with other teachers across the curriculum? (2) Could student teachers play leadership roles in such collaborative efforts? and (3) What areas of curriculum might emerge as a focus? The second objective centered on developing a website to feature collaboratively designed integrated projects from area schools where student teachers are placed.

Activities

The two major activities of the project involved student teachers developing mini-grant proposals and conducting projects that integrated academic and vocational curricula and the development of a website to provide ongoing information about successful integration projects.

The Mini-Grants

In mid-January 1999, a call for proposals was distributed to all student teachers in vocational and academic licensure programs (see Figure 1). From five submitted proposals, three were selected for implementation. One proposal was for constructing a hydroponics model; another was to study the history of the automobile industry; and the last explored the effects of wind and weather.

Using Instruction in Hydroponics To Integrate Curricula

The proposal to design, construct, and operate a tabletop hydroponics demonstration unit to integrate agriculture education, biology, and chemistry was initiated by an agriculture education student teacher in a small rural high school. The grant paid for the materials to build the hydroponics model. The agriculture student teacher and cooperating classroom teacher gave the high school students a hands-on experience with electricity, plumbing, and related skills through the construction of the hydroponics model. At that point, the agriculture education student teacher led her students through a study of the economic and cultural aspects of crops produced through hydroponics approaches. The biology teacher used the hydroponics system so his students could study plant physiology, nutrition, and growth requirements. The chemistry teacher's students were involved in balancing, measuring, and monitoring the chemical inputs. Several of the lessons were taught in large groups with students from all three classes involved. The project focused not only on the science SOLs in earth science, biology, and chemistry, but also incorporated English SOLs and mathematics SOLs.

Linking Curricula by Studying the Automobile Industry

The proposal to study how the automobile industry has changed American society since the early 20th century was collaboratively designed

Figure 1. Mini-Grant Call for Proposals Focusing on Integrating Academic and Vocational Curriculum

As a follow-up to the Team Building Conference attended by selected student teachers this fall, we have received a grant to fund some projects for which a student teacher has developed with his or her cooperating teacher and other teachers and/or student teachers in the same school a project that involves at least one academic area and one VTE area. All spring student teachers are eligible whether or not they attended the conference.

Purpose: We are trying to encourage student teachers to develop their skills of collaboratively planning and implementing integrated curriculum projects.

Procedure: A short description of the ways that curriculum will be integrated and/or lesson plans/unit plan and the costs can be submitted to the Center for Teacher Education (225 WMH) or to a faculty member. The proposals will be reviewed by a committee. We will send the money to the school, which will be responsible for arranging for the purchase of materials, supplies, or equipment. Your teacher can help you with this. All secondary student teachers are eligible. Grants are for spring semester only and can be submitted at any time.

Amount: Grants of up to $300 will be the norm, but an exceptional project involving a number of teachers and students could be funded for more money.

Nature of the Projects: The projects do not have to be "original" or elaborate. The point is to integrate other subjects into a project and involve other student teachers or teachers in the school in the project. The money might fund a field trip, buy materials for students to work with, buy equipment or materials that would stay in the school after you leave (e.g., a computer program, reference materials and books, visuals, and/or maps). Emphasizing some SOL objectives would be appropriate but not required; however, if you need a reference for how to integrate SOLs, each faculty member has a copy of SOLs in VTE cross-listed with every academic area.

Documentation of the Project: You should take pictures and/or save some examples of student work. The Center for Teacher Education will also ask you and/or your teacher to talk with a researcher about your experience.

by a history student teacher and his cooperating classroom teacher in a large county school vocational education center. Two American history SOL objectives were emphasized. Other teachers involved in the project were agricultural education, business, health occupations, marketing, technology education, trade and industrial education, and work and family studies. The students studied Henry Ford's assembly line theory; the impact of technology on the industry, on employee salaries, and on the demand for

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higher employee skills; the cultural and family changes brought about by the automobile; and so on. Because a major objective was to show the need for highly developed work and technology skills in the automobile industry, the bulk of the grant was to support a field trip to an area Volvo plant, where students would see the technology in operation and be able to talk with employees.

Collaborating To Learn the Effects of Wind and Weather

The proposal to study the effects of wind and weather was a collaborative project in a large city middle school. The project headed up by a math and science student teacher and her cooperating teacher in a self-contained 6th grade classroom involved SOLs in math, science, English, and geography. An agriculture teacher in an exploratory program was also involved. The grant paid for a class set of a book titled *Night of the Twisters* by Ivy Ruckman, which served as the basis for mathematics problems, experiments, and written and oral reports on their experiments. Students used the Internet to study weather, and used weather statistics to develop tables and graphs from the information. They learned to create weather reports for both print and television media, studied the science related to tornadoes, learned the geography of the country as it relates to tornadoes, and did a number of other activities in the agriculture exploratory class as well. The culminating activity, a trip to the city's Science Museum and a weather station, provided opportunities for writing and discussion.

The Website

Also during 1999, a website linked to the Center for Teacher Education at Virginia Tech was developed. The purpose of the site is to provide an archive for collaboratively designed integrated projects by both student teachers and area teachers. Videos from the conference for preservice teachers and area teachers who were involved with integrated projects provided the basis for initiating the website. Written summaries of the projects were constructed from the video and audio recordings, and links to video clips of the teachers and the student projects were embedded in the summaries. Additionally, the student teacher mini-grants were showcased. Resource links can be found at the website. The website also includes an interactive section where teachers can post projects they have done and connect with other teachers interested in collaborative academic and vocational curriculum.

Results

Toward the end of the semester, the three student teachers and their cooperating teachers were interviewed at their schools. Photographs of the

projects and student work were taken to become part of the archives for the website, to make them accessible to other student teachers and faculty.

The most successful project was carried out by the agriculture student teacher. She had initiated the idea for building the hydroponics unit because she wanted "students to enjoy being in the lab" and could see that the school was very poor in terms of resources. She "saw this as a way to get needed funds and integrate academics at the same time." She also pointed out that she had done "something similar in extension and knew that hydroponics lent itself to incorporating different subject areas." Her cooperating teacher agreed that the student teacher saw the connections to other subjects and contacted other teachers to get them involved in the planning. She credits her cooperating teacher with providing a supportive environment because he was "open to letting me try anything; he gave me a lot of freedom to experiment."

When asked about students' reactions, she reported that "they liked it because it brought enthusiasm into the class." Although the students were skeptical about growing plants without soil, that is what "made them interested." She also discussed the fact that many of her students were alternative education students and needed "to have academics integrated with vocational education to improve those skills." When asked if she would do such integration projects as a teacher even though they might require more work, she replied with conviction, "Yes, I really believe in integration. I think it strengthens vocational education." As important, however, was that the overall impact of the project enabled her and her students not only to learn but also to feel they had contributed to the school's betterment by leaving for future classes the hydroponics demonstration unit.

The project involving the effects of wind and weather submitted by the math and science student teacher with her 6th grade cooperating teacher did an excellent job of integrating math, science, English, geography, and agriculture economics concepts because the work was carried out primarily in a self-contained classroom. The cooperating teacher was the primary source of information for writing the grant; however, the student teacher wrote the grant and conducted the majority of the work called for in the grant. Overall, it was a good experience for the student teacher. She was initiated into the planning process for integrating curriculum because her cooperating teacher "is a big proponent of integration, so tries to do it whenever possible; she made me see the benefits of this." The student teacher also noted that students "see the connections between the different subjects, which is important; they liked it." Because the student teacher learned how to write a grant proposal, she indicated a willingness to look for opportunities to write others. She liked the empowerment and status the grant funding gave her in the school. For a student teacher, these are big steps in professional growth. A minor disappointment the student teacher experienced was that she could not participate in the culminating

field trip, which "all the students were looking forward to." Student teaching ended in early May, but the field trip was scheduled in early June after all the SOL and other standardized testing were completed.

The proposal to study changes in the automobile industry through an integrated American history and related courses in a vocational education center proved to be a learning experience for the student teacher. All the coursework was carried out in preparation for the field trip to the Volvo plant where students would see the technology in operation and talk with employees, thus gaining an appreciation for the need for a highly skilled, educated workforce. The ironic pull between cognitive and affective learning was powerfully demonstrated for this student teacher. End-of-year SOL testing in American history and the low scores in American history throughout the state caused the principal to cancel the field trip; however, as the student teacher and cooperating teacher reflected on the experience, neither was daunted. They recognized the ease of integrating their academic curriculum in a vocational school setting, where other teachers were always looking for ways to collaborate. They vowed in the future, however, to "plan the timing of major curricular events with SOL testing in mind."

Discussion

The overarching goal of this project was to embed the culture of collaborative planning among academic and vocational student teachers in their school sites and to provide a system for supporting such collaboration. The three funded curriculum projects established a foundation for institutionalizing that culture and at the same time answered some questions regarding the role of student teachers in such activity. The website has not been functioning long enough to get any clear assessment of its usefulness in supporting the planning of integrated curriculum projects, especially by student teachers.

We had raised three questions at the outset concerning the role of student teachers in collaboratively planning units of study that involved other teachers in their schools: (1) Would the mini-grant process encourage student teachers to collaborate with other teachers across the curriculum? (2) Could student teachers play leadership roles in such collaborative efforts? and (3) What areas of curriculum might emerge as a focus?

The mini-grant process did encourage collaboration. From the five proposals submitted, we chose the three that represented the best potential for collaboration and integration. Prior to this project, little if any activity of this type had been encouraged as part of the student teaching experience. As to the student teachers' leadership roles in seeking ways to collaborate and integrate, the results here were mixed. The nature of the situation in which student teachers found themselves was one factor. For example, if they were with cooperating teachers who were already integrating as in

the 6th grade classroom and the vocational education center, the process was easier, and they would be encouraged to write a grant for implementing a new project. In the most successful case, the agriculture student teacher was older and had had other work experiences that gave her confidence to assume the leadership.

When we asked spring semester academic student teachers, who had not submitted grant proposals why they had not, we received several different responses that will prove useful. One reason was that they did not find out about the grant until it seemed too late. Despite mass distribution of the call through faculty advisors, that no doubt is true. The beginning of the semester is quite busy for student teachers and, although many had participated in the fall conference on integration, other issues seemed more pressing for them. Another reason was that their teachers did not need any materials for planned projects, which meant those student teachers were definitely following, not leading. One of the most valid observations was that they did not know how to write proposals or grants, even though the wording on the call was as simple and nonthreatening as we could make it. One suggested a short course in proposal writing. Certainly a sample proposal may have helped some student teachers see how to handle the process.

We found that student teachers in some curriculum areas more readily see opportunities for collaborative integration. More proposals were submitted by agriculture education student teachers than any other group. This supports the findings of Roegge and Ferej (1995) who indicated that agriculture teachers saw biology content as a necessary component of their instruction and, therefore, integration was almost a requirement of the instruction. Although agriculture teachers are integrating content within their own classrooms, it still remains difficult to move into a collaborative planning situation as the agriculture student teacher in our project was able to do.

Involving New Teachers in the Integration of School and Work

Introduction

The probability that a teacher will require different skills in the future is becoming apparent to many teacher educators. Teachers for the 21st century should be able to provide a comprehensive multicultural, experiential, and real-world educational experience for their students. The school-to-work movement, which began in California over 15 years ago, has grown to over 200 high schools or career academies (schools-within-schools) in over 25 career fields. The unique structure of this reform movement specifically addresses the disconnect between traditional academics and the ability of our young people to capitalize on the opportunities in our increasingly technological society. Linking high school subject matter to the real world of work and future employment possibilities is vital to student success in both career pursuits and postsecondary education (Bailey & Merritt, 1997; Stern et al., 1992).

The integration of vocational and career awareness into academic subjects in order to promote learning that is both rigorous and applied is a challenge for teachers with no business or industry experience themselves. A curriculum replete with real-world contexts and skills is not presently taught in most teacher education programs. Science teachers in academies are asked to develop and teach field-based investigations and problem-solving methods (where school-taught knowledge is applied to nonschool settings), even though they often have little laboratory or technology experience outside of regular university courses.

The purpose of the materials developed and the infusion of school-to-career strategies is to provide single subject teacher candidates at UC Berkeley, and the students in their classes, the opportunity to see connections between what is learned at school and a world that grows increasingly complex each day. Research in the school-to-work reform initiatives, designed to make education more relevant to the lives of young people, is of value only in the context of focused efforts to prepare the teachers who carry out the task of educating these students. The participants in the work at UC Berkeley support a new vision for preparing teachers who are skilled in linking cutting-edge research, ambitious academics, and their own developing pedagogy, coupled with contextual community and workplace learning that translates into teaching curricula that are relevant to their students.

Previous efforts were to bring together experienced teachers from local academies with teacher educators from UC Berkeley to explore issues in

academy teaching and plan activities to introduce school-to-work issues into our preservice teacher education programs. The teachers were from academies in three local high schools—Fremont High School and Oakland Technical High School in Oakland, and Thurgood Marshall High School in San Francisco, representing a range of school-to-work efforts in a Health Academy, a Media Academy, and an Architecture Academy. In the summer of 1998, these teachers joined the teacher education staff of the CLAD, MACSME, and Scientist to Teacher programs. Ideas were generated and refined into activities that could be developed in the teacher education programs. These activities fell into three categories:

1. Activities that we thought could be implemented for all students in CLAD and MACSME and those activities that were already practiced but perhaps not in collaboration with the academies.
2. Activities in which selected students, based on background and interest, could be encouraged to engage. Clearly, this is dependent on identifying students in CLAD and MACSME who might pursue an interest in academy issues.
3. Activities that may require longer-term development and are dependent on other factors such as funding or the cooperation of other groups (e.g., school districts or industry.)

Constraints on each activity were discussed and evaluated. The activities and constraints in each category are discussed below.

For All CLAD and MACSME

Hold joint sessions of Methods for CLAD and MACSME in which academy issues such as the following are discussed:

- Expose student teachers to the historical context of different models of school reform. Place the School-to-Career movement in this context.
- Bring in academy teachers to make presentations to student teachers. Workshops of one to two hours might include examples of crosscurricular units and student projects, a discussion of how these units meet state standards and grading (i.e., A-F) requirements, and a discussion of the implications of high expectations for all students and how this is manifested in the academies Money for honoraria for academy teachers making presentations must be allocated.
- Take up issues of writing across the curriculum in a serious and systematic way whereby both the issues of writing and the content are honored.
- Develop video archives of academy teachers, student presentations (senior projects), and so on. Analyze these from multiple perspectives,

including pedagogy and content. Appropriate sites must be found for videotaping, and logistical constraints must be overcome.
- Expand student teachers' attendance at "working" faculty group meetings to include academy meetings. Find models of meetings in industry or time management courses for comparison. (These may be in a videotape format.)

For Selected Candidates

Identify those student teachers whose background and/or interests would make them appropriate candidates to engage in some or all of the following activities:

- Assign projects for Methods which may include examining curriculum, policy, and/or teaching methods in the academy setting. Possible expansion to MA projects.
- Develop first semester placements (for MACSME students) in which student teachers engage in observations and participation in academy classes. Time to coincide with the six-week academy cycle. Include "shadow" observations of academy teachers and students, and interviews of students about motivation, attitudes, and interests. Engage student teachers as advisors for student projects, perhaps in conjunction with industry advisors.
- Develop student teaching placements, joint placements if possible, for both CLAD and MACSME students in academy settings. In addition to other activities, student teachers would develop and teach integrated units, hopefully with a partner, then discuss the outcomes. At a minimum, student teachers would consult with academy teachers and student teachers in other programs to design smaller activities within the units.
- Encourage CLAD and MACSME students to become involved in faculty research into academy issues (e.g., Center for Research on Education and Work [CREW]). Ensure students get appropriate credit.

Possible Long-Term Projects

Develop relationships with academies, school districts, and industry to facilitate the following:

- Develop summer internships for student teachers in industry with local employers. Obviously, this requires the cooperation of industry partners.
- Pay student teachers to supervise high school students in their industry internships, perhaps in conjunction with above. Explore other paid summer positions related to School-to-Career issues. Funding must be found.
- Work on developing a pipeline for student teachers to be hired to work in academies in the school districts after graduation from UC Berkeley.

Requires cooperation of districts, including altering or exception to current hiring practices.

These activities formed the basis for the 1999 Initiative described below.

Objectives

In an effort to keep pace with the many reforms in K-12 education, to explore the new teaching skills required of career academy teachers, and to integrate education-and-work reforms into teacher education programs, the secondary teacher preparation programs in the Graduate School of Education at UC Berkeley built on the work done in the previous initiative by developing the activities discussed in the "Introduction" to the chapter. The following were our specific objectives for this phase of the initiative:

- To introduce MACSME and Scientist to Teacher candidates to academically rigorous work-based learning experiences.
- To introduce student teachers to academy curricula through workshops presented by academy teachers on topics such as crosscurricular units and student projects, state Standards and grading requirements, and high expectations for all students.
- To promote the incorporation of collaborative research and scientific inquiry into the programs through partnerships with Lawrence Berkeley National Laboratory scientists.
- To explore and develop curricula, and to apply work-related content for summer internships for high school students as partners with academy.
- To identify and create instructional activities with technological support for teaching real-world applications in science, math, and technology.
- To expand the discussion and exploration of implementation and integration strategies to larger areas within the university and beyond.

Activities

Our initial focus was on developing and expanding the activities initiated from the ideas generated in our previous planning sessions. Honoraria were awarded to academy teachers for developing presentations on the topics proposed in those sessions. Student teacher activities, such as observations, shadow assignments, and projects, were examined to better facilitate their effective implementation. We also explored the use of video technology for analysis of academy teaching and other academy activities such as student presentations. The emphasis on each of these was to integrate issues of School-to-Career teaching into the existing structures of MACSME and Scientist to Teacher programs. We also explored the possibilities for developing exportable models.

MACSME

The MACSME program is a model teacher preparation program that combines extensive practice teaching with coursework on theories of thinking and learning, and with multiple research experiences. Integration of School-to-Career issues into the MACSME teacher preparation program extended across a broad front. A variety of activities were integrated into the Teaching Methods course and into the Supervised Teaching activities for MACSME students. Each of these was a modification or extension of existing activities in the program. Thus, School-to-Career issues could be integrated into teacher preparation in such a way as to make them a part of the ongoing teacher preparation program as opposed to a "one shot deal." As suggested by the previous planning, many of these activities involved all the students, while other activities involved only those students with select backgrounds and interests.

While coursework on contextual learning, including as it pertains to domain-specific cognition, has always been included in the MACSME program, the connection between this and the School-to-Career movement was developed. A series of activities in the Teaching Methods course introduced students to the theory and the practice of School-to-Career learning. These activities included readings and guest lectures introducing the School-to-Career movement. Based on the recommendations of the academy teachers we engaged, MACSME students were asked to read chapters from the introductory book, *Knowing & Doing: Connecting Learning and Work*, by Lili Allen, Christopher J. Hogan, and Adria Steinberg (1998). The first chapter provides an excellent introduction to the issues, while the second introduces the practice. Since it is a tenet of the program to bridge theory and practice, this combination was a perfect fit.

Guest presentations around a wide variety of educational issues have allowed us to reach beyond the finite (though extensive) expertise of the faculty and staff. Guests have dealt with such topics as conflict resolution in classroom, interactions with parents, counseling, and administration. By adding guest presenters in School-to-Career issues, we could readily integrate the issues into our ongoing program. These have varied from single presentations by local experts on School-to-Career issues, such as Patricia Clark of the Alameda County, California, Office of Education, to extended workshops presented in collaboration with our academy partners. The first of these took up issues of writing in science. In the fall of 1998, we began integrating issues of writing in math and science with activities by a teacher in a local career academy. These issues were continued in the subsequent semesters.

During the Fall of 1999, we engaged in a series of workshops presented by a team of teachers from career academies in Oakland and San Francisco. These workshops were developed collaboratively by the academy teachers working with the teacher education staff at Berkeley. The first of these

workshops connected the goals of School-to-Career academy teaching to specific examples of assignments and student work. The workshop also engaged the student teachers in an activity that is representative of activities in which high school students in career academies engage. The second workshop exposed MACSME students to some specific teaching methods used in career academy teaching. Student teachers engaged in an extended application in which these teaching methods applied. Each of these activities was designed to integrate School-to-Career issues into the existing structures of the MACSME program as an ongoing part of bridging theory and practice.

The MACSME program has also worked extensively with video technology. Building on the pioneering work of John Frederiksen in teacher video clubs (Frederiksen, Sipusic, Gamoran, & Wolfe, 1992), MACSME students have engaged in video analysis using both the framework for Video Portfolio Assessment developed in those video clubs and a framework developed from the California Standards for the Teaching Profession, as well as using Alan Schoenfeld's (1997) Model of Teaching. These have included examining the teaching of experienced teachers and their own teaching. In the Fall of 1999, we incorporated the analysis of videos of a variety of academy activities. These included videos of opening activities as teachers oriented students to academy programs, ongoing academy activities, and final student presentations. Special emphasis was placed on examining these activities through the lens of the California Standards for the Teaching Profession. This was to present alternative models of teaching activities and to emphasize the extent to which these alternative activities conform to the accepted standards of the profession.

The MACSME program includes extensive field experiences across all four semesters of the two-year program. These include observations, shadow assignments, team-teaching placements, and full takeover supervised teaching. Integrating School-to-Career experiences into the MACSME program occurred almost seamlessly beginning in the fall of 1998. Students began by observing in local career academies, including a health academy and an architecture academy. Students shadowed academy teachers and students to observe the academy experience from multiple perspectives. Select student teachers were chosen to do team-teaching and full takeover supervised teaching in career academy settings. These student teachers have gotten a full and intimate exposure to the issues of teaching in academy settings. Since each of these assignments is a normal part of the MACSME program, though not previously set in career academies, the issues of teaching in academy settings has been quite smoothly integrated into preservice teacher preparation at UC Berkeley.

Scientist to Teacher

Scientist to Teacher is a new program of teacher education being piloted at UC Berkeley in conjunction with the San Francisco Unified School District. This new delivery model in which teachers are training while serving as interns provides the opportunity for linking theory and practice in a structure that promotes an active framework that undergoes constant evaluation and change. Intern teachers have the opportunity to immediately apply the information they are learning in the reality of their own classrooms. The scaffolding that supports the Scientist to Teacher model is exemplified in the School-to-Career module the teachers helped to design. This pilot opportunity for teacher interns enables them to both expand their knowledge base as teachers and as active participants in the development of their own unique professional style of learning.

The School-to-Career module begins with a review of current research, highlighting faculty who specialize in the research. Best practice is similarly reviewed, and a team of researchers and practitioners introduce the module with presentations and discussions involving the full cohort. With the guidance of program instructors and faculty, the school team designs pedagogy that is shaped and infused with both research and best practice. Units or lessons are developed that incorporate the learning goals and objectives of the credential requirements and the California Standards for the Teaching Profession as tailored to each individual teacher's classroom needs. Theory is applied through the practice of the intern teacher directly into the intern teacher's classroom and curricula. An on-site master practitioner teacher acts as peer coach and mentor, providing the intern with the opportunity to observe a variety of teaching styles and applications based on the experienced teacher's familiarity with and access to the school faculty. Debriefing and redesign of observed lessons in small group cohort work adds the factor of instant feedback to the developing intern teacher.

Summer Internships and Collaborative Activities

Program leaders are working with exemplary academy teachers in the Bay Area to construct a portfolio of teacher activities that lend themselves to teacher preparation and expansion of School-to-Career methodologies in CLAD, MACSME, and Scientist to Teacher. The collaborative group decided to bring their most successful teacher activities and strategies, along with their suggestions for the implementation of career education curricula in teacher preparation, and assemble an action portfolio for future reference to be housed at UC Berkeley. The final collaborative working portfolio will include a collection of teacher preparation strategies that will serve as a resource for future teacher education courses at UC Berkeley and the surrounding Bay Area.

The action portfolio for inclusion in programs at UC Berkeley will reflect the input of teachers and student teachers who participated in internship

activities this past summer. The work of these teachers will serve as a template for future collaborative internships for both MACSME and Scientist to Teacher. One MACSME student apprenticed with an extraordinary academy teacher, Patricia Clark, as she supervised high school student internships in local industries. This MACSME student developed insights into the process and specific skills involved in supervising high school students. These she shared with her cohort of students at UC Berkeley. She also developed curricular materials, based on the experiences of the high school students she supervised, which she also shared with her cohort of participating teachers. These assisted the team from UC Berkeley in identifying and incorporating School-to-Career skills that are useful in teacher education into the portfolio, particularly for preparing future candidates for teaching assignments that involve student internships.

Two MACSME students and one Scientist to Teacher master teacher who worked at Lawrence Berkeley National Laboratory (LBNL) to develop skills in cutting-edge science are now able to transfer their authentic laboratory work experience to their own classes. These LBNL interns identified specific competencies that are of value to business and research, and that are also applicable to school science classes. These included specific lab routines and activities. Each intern also collected curricular ideas that bridge academics, research, and the real world. For example, one intern developed lab activities for her students based on her summer work on breast cancer research. Another intern, who worked with bacterial cultures in studying HDL and related blood proteins, developed activities related to diet and to bacteriology.

Two interns produced a website for use by educators and students, focusing on microbiology and biotechnology. The site had two parts: (1) an annotated list of links for students or teachers doing curriculum or projects in these fields and (2) a series of interviews with people working at LBNL. The interviews are with four people on research tracks (an undergraduate, a graduate student, and two staff scientists) and one person working as a machinist and supervisor in the LBNL machine shop. The interviews emphasize what students can be doing and exploring if they are interested in pursuing careers in research or careers (such as engineering/shop work) that support scientific endeavors. The interview subjects are diverse in gender and ethnicity, and the interview pages feature photos of the subjects in their work environments. The website itself, as well as the knowledge the interns gained by doing and transcribing the interviews, are to assist their students and other teachers in making the link between classroom curriculum and work in and around the life sciences. The interns, working with the project team, incorporated these activities and curricular ideas into the Teaching Methods courses at UC Berkeley.

Evaluation

The outcomes of the collaboration in incorporating School-to-Career experiences into teacher preparation at UC Berkeley were evaluated along two dimensions. The first dimension was the collection and delivery of School-to-Career materials and the development of activities for use in the collaboration. These included the presentations developed, the readings collected, the activities developed for preservice teachers, and the modules developed for the interns. Also included were videotaped teaching segments of School-to-Career units by experienced and new teachers, curriculum projects and web-based materials designed by teacher participants in the summer internship at LBNL, School-to-Career modules and contextual learning designed by intern teachers showing how their students are learning about the relevance of their schoolwork, and the various curricular and activity-based resources submitted by exceptional academy teachers who joined the team this past year. These materials and activities of the student teachers, experienced teachers, and other program participants were successfully integrated into the various components of this collaboration.

The second dimension was the impact on the teachers participating in the collaboration. For some student teachers and interns, this was simply exposure to issues and observations of activities and School-to-Career teaching. These experiences were reported as being interesting and valuable to the developing teachers. In particular, the videotaped teaching sessions and student presentations were greatly appreciated by the preservice teachers. Those who got more involved in the collaboration got more out of it. Student teachers who did student teaching placements in academy settings experienced firsthand the day-to-day reality. Similarly, student teachers and interns who participated in summer internships, both at the LBNL and supervising high school students, found the experiences to be extremely valuable. They reported developing understandings of both the world of work and of teaching; in particular, they developed techniques and connections which they felt would be beneficial either in a School-to-Career academy setting or in more traditional settings.

Conclusion

This project has significantly affected how single subject teachers are prepared at UC Berkeley. Future curricular planning will incorporate many of the recommendations generated by project participants. By building on existing frameworks in teacher preparation and by integrating issues of contextual learning and real-world connections, we have identified the following curricular and structural changes that will impact our programs:

- The increase of options for teachers in mathematics and science to participate in preservice and veteran teacher internships in research laboratory settings.
- The expansion of future internships to include participation of full cohorts of student teachers, master teachers, and students who reflect California's diversity.
- The incorporation of techniques for developing integrated curriculum between academic disciplines.
- The development of project-based learning experiences for preservice teachers.
- The promotion of skills that enable teachers to sequence projects and project components of increasing complexity in their teacher preparation programs.

These developments will allow us to meet the goal of preparing teachers who are able to make connections between concepts they teach in the classroom and applications outside the classroom that are meaningful to their students. Future graduates of our credential programs will feel comfortable in the workplace and will increasingly be able to incorporate workplace techniques into their teaching while welcoming workplace professionals into their classrooms.

Preparing Community College Instructors for Curriculum Integration

Context

Real and significant changes are occurring at the elementary, secondary, and postsecondary levels of education. Consequently, reform is the watchword. In elementary and middle schools, students are exposed to cooperative teams that facilitate the learning of mathematics and science concepts and how to apply them to real-life problems. At the high school level, teachers experiment with new educational technologies to enhance student outcomes. Significant changes are also occurring at the community college level, at which a shift can be seen from a predominantly "teaching" to a "learning" paradigm. Increases in diverse student populations served by community colleges demand that community college educators give more attention to curriculum and instruction that address students' varied learning needs.

There is little disagreement that curriculum integration is an important strategy community colleges can use to meet challenges associated with the changing composition of students, faculty, curricula, and communities (Bragg, Reger, & Thomas, 1997; Copa & Ammentorp, 1997; Illinois Task Force on Academic and Occupational Integration, 1997). At the heart of this reform is improving what and how learners learn by organizing the best curricular and pedagogical practices of academic and vocational education into a single, "integrated" experience. Not as clear, however, are which academic and vocational integration approaches should be used in community colleges or the nature of the implementation process (Bragg et al., 1997).

Tech Prep (technical preparation) is one of the most compelling reasons for having a better understanding of curriculum integration models. Strongly endorsed by the Carl D. Perkins Vocational and Applied Technology Education Act of 1990, commonly known as Perkins II, Tech Prep is aimed at developing the "academic and occupational skills of all segments of the population" (Bragg, 1995, p. 191). Central to this program goal is the need for integrated curriculum that blends and reinforces both academic and vocational content into a core curriculum that is practical and motivating and, at the same time, demanding and liberating.

For many years, the College of Education (COE) at the University of Illinois at Urbana-Champaign (UIUC) has had a keen interest in the preparation of community college personnel. Since the late 1960s, the

Department of Human Resource Education (HRE) has played an active role in the preparation of community college faculty and administrators. At the same time, the Department of Educational Organization and Leadership (EOL), as part of its Higher Education program, has engaged in the preparation of community college administrators. Both separately and collaboratively, the two departments have led the COE's efforts to address the needs of community college personnel, as resources have allowed.

Over the past decade, the HRE department has been particularly active in emphasizing graduate education and securing research support for concerns linked to community college education. In 1989, the department received a grant from the Illinois State Board of Education (ISBE) to establish the Office of Community College Research and Leadership (OCCRL). After ten years of operation, OCCRL and its affiliated HRE faculty continue to engage in research and development activities that improve the quality of community college education in Illinois, particularly in the areas of occupational education and workforce development.

For the past 11 years, the HRE department has been one of eight sites of the U.S. Department of Education's National Center for Research in Vocational Education (NCRVE), headquartered at the University of California, Berkeley. As part of their responsibilities as an NCRVE consortium site, HRE faculty have undertaken numerous research and development projects associated with community college education. NCRVE-sponsored research includes studies to enhance the quality of vocational teaching, to apply cognitive science to technical instruction, to assess educational outcomes, to integrate academic and occupational education, and to articulate secondary and postsecondary curriculum.

Objectives

Based on the need for a better understanding of curriculum integration, this project focused on identifying methods and best-known practices that assist community college faculty and administrators in more effectively integrating academic and vocational curriculum. Objectives for this project included the following:

- To identify selected best-known practices for integrating academic and vocational curriculum at the community college level.
- To determine the role of learning styles, multiple intelligences, and contextual learning in the integration of academic and vocational curriculum at the community college level.
- To integrate the above findings into the UIUC Community College Leadership (CCL) Teaching and Learning Course.
- To develop action plans identifying the facilitation of academic and vocational curriculum from a faculty perspective.

- To determine students' reactions to their UIUC CCL Teaching and Learning course experiences.
- To incorporate findings into the UIUC CCL curriculum.
- To incorporate findings into selected UIUC CCL program requirements.

Activities

The first two project objectives focused on identifying practices and determining various aspects of learning related to implementation strategies for three models of curriculum integration. This project built upon a white paper developed by the Illinois Task Force on Academic and Occupational Integration (1997) which sought to determine how academic and occupational integration was occurring throughout Illinois community colleges. Using national definitions, the Illinois Task Force surveyed community colleges in order to identify current practices at various sites and to gain some understanding of the nature of resources needed for successful implementation. This project was designed to build upon as well as build beyond the Illinois Task Force study by (1) following up on the current status of implementation since the development of the white paper; (2) identifying the reasons for moving towards models of curriculum integration; and (3) gaining a more in-depth understanding of the organizational infrastructure, culture, and resources needed to maintain implementation.

The three models were selected according to the levels of detail, planning, and resources needed for implementation. The models included (1) applied academics, (2) pair or tandem courses, and (3) learning communities. Based on their implementation of these integration models, three colleges were selected to participate in the present study: Illinois Central College (ICC), Illinois Valley Community College (IVCC), and McHenry County College (MCC). Data were collected from faculty and department heads as well as from deans and vice presidents of instruction. The data were gathered through a series of 60-minute focus group sessions at each community college site. All focus group sessions were audiotaped and later transcribed. Reliability of the focus group guide was established through member checks and pilot testing.

The third objective focused on integrating project findings into a UIUC CCL course. During the summer session of 1999, the course entitled "Teaching and Learning in the Community College" was delivered to cohort students enrolled in the Community College Executive Leadership Program (CCELP) at UIUC. The course was based on O'Banion's (1997) book titled, *A Learning College for the 21st Century*. One objective of this course was to introduce students to alternative models of curriculum development and delivery and to examine how these models might be implemented at their respective community colleges. Sessions were devoted to examination and

discussion of the various curriculum integration models, their intricacies, and their design and implementation requirements. Students were provided with and required to read the transcripts from the focus group sessions as well as the summary document that compiled themes across all three community colleges.

As part of the course requirements, students developed two lessons around the applied academics and tandem models. Each lesson was required to include three to five sample activities that supported the integration of the subject matter. The lessons were to be shared with faculty at the respective community colleges, with implementation being highly encouraged.

A final strategy used was to invite former high school students into the course so they could discuss their personal experiences while participating in integrated activities. Although they did not know the theory associated with their experiences, these students could articulate the differences in methods and strategies between integrated courses and non-integrated ones. One student discussed how his experiences better prepared him for work in auto body repair because he understood the application behind academic courses. This student indicated that he was bored with the courses being taken at the local community college because they were all lecture-based. A second student told class members that as he entered his freshman year of college, he was able to test out of one math course and two English courses. This was primarily due to the integrated instruction he received in high school.

Based on the lessons learned about the three integration models, action plans are being developed that will identify design and implementation strategies for each. The intent of this objective is to provide current and future community college faculty and leaders with "job aids" that they can use to guide their curriculum integration activities. As part of an in-class activity, students in the CCL Teaching and Learning course were required to develop guidelines for the implementation of the three integration models into existing curriculum practices. During the next four months, the products from this activity will be expanded upon by project staff, and job aids will be prepared that can be disseminated to persons interested in implementing the three models of curriculum integration.

Another objective focused on determining students' reactions to their course experiences. Through discussions with students who took the summer course, project staff were able to identify the benefits of and challenges to developing and implementing models of curriculum integration. Project staff will conduct follow-up phone interviews with students later this year to obtain their long-term reactions to the course experiences.

The final two objectives focused on incorporating findings into the CCL Teaching and Learning curriculum and into selected program requirements. The CCL faculty members view curriculum integration as an essential

process in which community colleges need to engage and an important area of faculty development. Therefore, UIUC has begun utilizing the findings from this project, in conjunction with others, in the continued planning and development of the Teaching and Learning strand of the CCL program. In addition to using the findings in future Teaching and Learning related courses, project staff will be hosting an on-site focus group meeting at UIUC in order to gain additional information to shape the Teaching and Learning program. This meeting will be held during September 1999 and will be comprised of a community college president, one member of the Illinois Community College Board, two vice presidents of instruction, two Teaching and Learning center directors, two department chairs, and three faculty members. The goal of this meeting is to gain additional insight into trends facing the Teaching and Learning component of community colleges and to learn about the curriculum and professional development needs for those professionals who seek careers in Teaching and Learning rather than executive leadership positions.

Results

Reasons for Using Curriculum Integration Models

All three community colleges included in this study had implemented two or more different curriculum integration models on their campuses. ICC had implemented applied academics and learning communities, IVCC had implemented applied academics and tandem courses, and MCC had implemented tandem courses and learning communities. The three community colleges had several of the same reasons for making changes in their method of curriculum delivery. One common reason was the goal of moving from a teacher-centered to a student-centered environment. This was a concern shared by all community colleges regardless of which curriculum integration model(s) had been implemented. All of the models implemented at the three community colleges assisted with meeting this goal, each in its own way. Administration from IVCC summarized this point well, "It is part of our mission . . . (to be) student centered, to create better teaching and learning opportunities. . . ." All of the curriculum integration models discussed here focus on the needs of the learner and help to involve students in the learning process.

A second reason was to assure that students complete their general education courses (e.g., math, speech, and writing) by making these classes more meaningful to students and raising the level of accomplishment in this area. Traditionally, community college students take general education courses early on in their programs to get them out of the way; therefore, they may never have the opportunity to apply in practice what they learned in these courses. Some students wait until the end of their programs to take these classes and, thus, have no time left for application of the material;

others simply do not take the general education courses. By incorporating curriculum integration models, community colleges can bring general education experiences to students in a variety of different ways. This assists them in meeting the needs of all adult learners, allows students the opportunity to incorporate and practice these skills throughout their programs of study, and, ultimately, better prepares students for the workforce.

A third reason was to meet the needs of business and industry. Future employers of these graduating students want employees, including front-line employees, to be both producers and contributors. Having meaningful experiences in the classroom is vital to meet this goal. Without the use of curriculum integration models, it is more difficult to teach, incorporate, and build on skills such as teamwork, flexibility, problem solving, writing, speaking, and critical thinking. As one administrator at MCC put it,

> Integration was not the end. It was a means to the end which is to prepare these people with critical thinking skills, problem solving skills, communication skills, being able to be flexible, and being able to be team players. That's what we are trying to get at and I think we are doing it. If that is what we are accomplishing then, whether it is linked, or paired or extremely integrated courses, I don't think it really matters all that much.

A final reason was to implement curriculum integration activities that both keep students interested in the course content and encourage them to complete their programs of study. Often, traditional class lectures focus on theory rather than application. Without having relevant examples and opportunities to apply what they are learning , students perceive the content as being irrelevant to their future careers. As indicated by one community college interviewee, "With applied academics we give them real examples so they see what they're learning the information for. It's useful. It's not just theoretical." This person went on to say that without having some applied relevance in courses, students wouldn't stay. Through the implementation of applied academics, ICC has seen an improvement in retention of certain types of students who need to see the realness of what they are doing.

Cultural Elements

All three community colleges felt that both administrative and faculty support was crucial to successful implementation of curriculum integration activities. Without support from both of these entities, such programs cannot succeed.

Administrative Support

Several attributes were mentioned during the interviews regarding actions of supportive administration. Administrators who initiated and encouraged free dialogue about curriculum integration activities were viewed as supportive. Successful administrators used a subtle approach when talking with faculty about this concept, often using one-on-one conversations with staff. This type of approach establishes and encourages more dialogue about curriculum activities, which, in turn, helps staff "buy in" to the concepts. As a result, staff may decide to incorporate some of these strategies into their courses and test the concepts. At all three community colleges, it was a gradual process and not everyone willingly agreed or currently agrees with it. All three community colleges have seen an increase in faculty involvement since they implemented their initial models, however.

Another characteristic of supportive administration is the encouragement of faculty autonomy. Assuring that schedules allow collaboration of faculty and providing adequate meeting time to brainstorm ideas and to work on curriculum integration activities supports faculty autonomy. One administrator at IVCC described supportive administration as ". . . somebody who can empower others to turn loose; somebody who can let them go with an idea. You need somebody in leadership who's comfortable with it and who is willing to give resources."

Administrative support of faculty initiatives is also critical. This support may be evident in a variety of ways such as in providing direction to the faculty when they are unsure of what to do next or where to get resources. For example, administration at IVCC hired a consultant to work with a group of faculty who were interested in creating an integrated module project.

IVCC and MCC were able to provide release time to faculty to develop the initial curriculum integration activities; however, because of a lack of adequate instructors to cover release time, ICC chose instead to offer a stipend to faculty to incorporate curriculum integration activities into the curriculum. MCC noted that although they were able to provide release time for the initial development, they have gone to stipends more recently. This has occurred primarily because many adjunct faculty are not trained to teach integrated classes and, therefore, are not capable of conducting integrated classes while the regular instructor works on a new class. IVCC has continued their support by providing substitute teachers and by allowing staff to occasionally cancel classes for meetings. Typically, these types of efforts were funded through grant monies so that the institutions did not have to pay salaries for both faculty members.

Administrative support is also evident through the funding of professional development. All three community colleges felt that they had very good support from their administration regarding professional development opportunities, including funds for professional travel and

attendance at regional and national conferences. In addition, all three community colleges felt that their institutions did a credible job of training faculty on how to incorporate their selected model of contextual teaching, as well as supporting continuing faculty development. One administrator at IVCC commented, "You can't just expect people to come in and do things if they don't have the background, or the knowledge and the skills to do it. So you have to provide that (training to the staff)." While training and staff development for integrated teaching was very concentrated when the programs were new (offered at least once per week at IVCC), the intensity had lessened over the years. It is still a routine, ongoing process at all of the community colleges, however. MCC provides a stipend and graduate credits to their faculty for attending this training. Thus, their staff receives payment for attending the sessions and can also use this training to help move them up the pay scale. ICC and MCC encourage staff to take other classes at their colleges, which will help prepare them to incorporate integrated teaching into their curriculum. There is no cost to the faculty for these courses, and the faculty receives CPUs or clock hours for taking them.

In addition, all three community colleges felt encouragement from their administrators to write papers on their curriculum integration models and present these papers at conferences. MCC actually took that one step further. They have had a number of community colleges visit their institution to see their program and also hosted a fall 1998 conference for community colleges on curriculum integration.

One of the administrators at ICC noted that they attempt to bring in new faculty who are looking at being a part of a learning community and then encourage that involvement once they become oriented. This administrator meets monthly with the new faculty to find out "how they are helping the students to learn from one another, what the new faculty members are learning, and what they are changing in their classes as a result of what they have learned." She uses language that encourages the concept of learning from one another. She emphasizes that they are all sources of information, inspiration, and encouragement and that the students are a source of that, too. ICC is also big on providing commendations to their faculty members for their involvement in curriculum integration activities, providing credit to the faculty in their evaluations for their efforts with integrated teaching and considering these experiences as the faculty is reviewed for tenure. In addition, a Dean of Student Services was hired to support student and faculty in their effort; an Instructional Designer was hired to help incorporate technology into the contextual courses; and an Institutional Researcher was hired to oversee the college's research and to organize the research results.

Faculty Support

A community college cannot have a successful curriculum integration program with administrative support alone. One administrator at ICC

pointed out that the key to a successful program is "to have faculty advocates. . . . I cannot get it to happen (without their cooperation and participation). It has to happen from someone who really wants it to happen. . . . We are trying to create the situation for them to want to do it (and an environment that supports their needs)."

Support for new faculty is crucial to make a program grow and flourish. One new faculty member at MCC commented, "The support of the faculty members here has been really wonderful for me. There is a definite support network between those faculty who have been here for awhile and new faculty." One of the administrators at IVCC noted that she "did not have to do much to sell the program to new faculty because the faculty sell it. I had three new faculty members this year. Other faculty approached them and said, 'Let me tell you about Tech Prep.' . . . the selling came from the faculty that had been involved with it for a long time."

Faculty support is also nourished through the positive feedback and enthusiasm of the students. Once faculty realizes the extent to which students benefit from the curriculum integration efforts, it builds more support for the program and further motivates the faculty to continue their integration efforts. Faculty buy into the need to have each student succeed and are more interested in incorporating assignments that get students involved in classroom activities and other participatory assignments. Faculty from all three community colleges pointed out the noticeable growth of students who go through integrated classes. Positive changes were noted in respect to attributes such as an increase in student knowledge retention, confidence level, problem-solving skills, critical thinking skills, communication skills, ability to be flexible, ability to be a team player, and maturity.

Finally, in an effort to provide support to new part-time faculty, ICC implemented an adjunct faculty program. Selected adjunct faculty may go through training, at no extra pay, to learn more about the college. Then, for a small stipend, the adjunct faculty members act as mentors to new part-time faculty and also assist their department in a variety of other projects.

Impact of Curriculum Integration Activities on Students and Faculty

Student Impact

Overall, faculty at the three community colleges felt the students involved in the curriculum integration activities had stronger academic performance. Comments regarding their ability to be strong team players, possessing more developed critical thinking skills and better communication skills, having higher expectations of what they wanted out of the program and the ability to learn more from the courses, and overall being more confident in their presentation were attributes that were mentioned during the interviews. IVCC and MCC felt that more of these traits were obvious in the students who went through the courses where there was integration throughout the entire program. They also noted that the students, as well

as their employers, observed these changes in their abilities. This was a big motivation for the students who were excited to acquire and build on these critical skills. MCC also has their cohort students create a portfolio that is representative of their best work. The students can use their portfolios during interviews as examples of their experience, knowledge base, and abilities. ICC and MCC observed that more of the students who had gone through the contextual learning courses were completing internships to further expand their knowledge base and build on their work experience.

The faculty also felt that the students who completed the integrated courses were more likely to succeed overall. Many students have the perception that college is boring and scary and that they do not have to work with people outside of their field of study. Other students are coming back to school after having a number of years away from that type of environment and they are not sure that they can be successful. But with integrated curriculum, the classes are much less traditional. There is a lot less lecture and more discussion. The students get involved and do a lot of the talking. MCC noted that in the linked/tandem courses, specifically, "the students are involved with team projects and they learn to work together, even when they do not get along. They have to do a lot of critical thinking, problem solving, and decisionmaking as a team. They have to make it work." Faculty at IVCC also noted that "the students are more aware of what goes on in the world of work. Many of them start out with the idea that the only thing they have to do is whatever is in their narrow field. But they have to have the skills to work with others. That is the way it is in the real world." The realness that these students get exposed to through the contextual curriculum gets them much more involved with the learning process and it increases their motivation to succeed.

Faculty Impact

There have been several positive areas of impact observed with faculty that incorporated integration models into their curriculum. In general, it was felt that the faculty had more dialogue and interaction with the students. This interaction improved the faculty understanding of the student and appeared to make the faculty more comfortable with trying new things in the classroom. In general, the faculty appeared to incorporate more meaningful instruction, practical application, and student involvement in both their integrated courses as well as their non-integrated courses. Once the faculty got used to the concept, they tended to prefer this method of teaching and delivery.

Another noticeable impact that integrated curriculum provides to faculty is the opportunity for faculty from different areas of study to work together and also learn from each other. Together, they can design fun and interesting courses, which incorporate knowledge from each of their areas of expertise. As one MCC faculty member noted, "There has always been a division

between academic and occupation. This blurred our minds, it truly did. It's just astonishing to me to be able to work with them. I mean, I've learned so many things and I know they have, too."

Utilization of the Findings

As discussed earlier, students were required to utilize the findings from this study as they developed lesson plans and activities using the applied academics and tandem models. This assignment was received favorably by the students in the Teaching and Learning course. Students were encouraged to be creative in the subjects they integrated. In addition, they were not necessarily required to integrate academic and vocational courses, although most did. Initially, students thought this would be an easy assignment; however, students later reported that it was a challenge to think of ways to integrate courses that, on the surface, appear to have no connection. Examples included the integration of psychology and mathematics, psychology and history, sociology and truck driving, American history and woodworking, and band and metal works. It was also evident that a significant influence on the development of CCL students' positive perceptions of curriculum integration came more from the high school students' testimonies.

Action Plan Development

Based on class discussions, activities, and the integration assignment, students were given time in class to develop guidelines for implementing each of the three integration models. They were asked to think of how they would advise their faculty to accomplish this implementation effectively and efficiently.

The outcome of this activity was positive as well. Without guidance, students discussed the following cultural and leadership components that needed to be in place in order for these models to work well:

- The fact that faculty would need to switch from a "teaching" to a "learning" paradigm
- The time and other resources that would be needed for each integration model
- The type of working relationships across faculty and departments that would promote the models
- The idea of finding a "champion" that would support and promote the integration models and related activities
- Some practical tips for making each model work

It was evident through this project that they had a conceptual understanding of the models and at least a conceptual knowledge of what it would take to initiate the implementation of each.

Students' Reactions to and Application of Their Course Experiences

As noted earlier, the students of the Teaching and Learning course are being given an opportunity to implement these models and lessons within their community colleges. Project staff will conduct phone interviews during the fall of 1999 to identify the following:

- The models of curriculum integration being implemented
- The strategies for gaining buy-in from faculty and administration
- The strengths and weaknesses associated with each model
- The barriers to implementation

Incorporating Findings into the UIUC Curriculum

This continues to be an ongoing activity for CCL faculty. As the Teaching and Learning program continues to develop, curriculum integration will be incorporated into it. It is also the intent of UIUC faculty to initiate research studies that examine the impact of the various integration models on student outcomes.

Discussion

This study was designed to gain a better understanding of the nature and types of curriculum integration activities taking place in three Illinois community colleges. The study allowed NCRVE staff to better understand the type of infrastructure and resources that need to be in place in order to successfully implement curriculum integration models. The case study results provide the most insight at this particular point in the project; therefore, the major focus of the discussion will be related to the lessons learned and the implications related to infrastructure and resource results.

First, it was revealed that the implementation of curriculum integration models requires an individual or individuals to "champion the cause." This is consistent with many of the researchers who write in the area of organizational development and change (Kanter, 1983; Rothwell, Sullivan, & McLean, 1995; Schein, 1992). From these three cases, it is strongly recommended that these champions include, at a minimum, an administrator (dean or vice president of instruction) as well as a senior faculty member. It was well-articulated throughout the focus groups that without such individuals backing these integration efforts, they would not succeed. These individuals were needed to help sell the idea to other administrators and faculty. They were needed to obtain the necessary resources, especially in the start-up phases of the various activities. These champions essentially become the marketing agents for the curriculum integrated activities within the community college.

Second, the culture and infrastructure of the community college must allow for creativity and individualism. In other words, faculty must be

free to experiment, take risks, and make mistakes without the threat of repercussion from administration. Participants made it clear that many ideas failed the first time through; however, because of support from administration, they were able to improve their ideas and try them out again. Through these failures, new ideas for integrated activities emerged.

A third idea that emerged is the recommendation that these types of integrated activities begin on a small scale and should be allowed to grow and develop over time. Integration activities that are too comprehensive in terms of the detail and resource requirements of the model (i.e., learning communities vs. applied academics) are likely to fail. Related to this, activities that initially attempt to cut across several content areas can be at risk for failure as well. Success of integration activities is based upon a thorough knowledge of the resources available (e.g., time, money, and people) and a clear understanding of the desired outcomes to be achieved. In all three community colleges, the initial planning was extensive.

Across all three community colleges was the need for incentives in order to initiate these various types of integrated activities. Because of the amount of work and time it takes to do these types of activities well, measures had to be put into place that would provide motivation for those involved. These incentives varied across colleges but included money, release time for planning and development, and professional development activities. As the integration initiatives matured, the incentives began to shift as well. These included the opportunity to showcase efforts through open houses and conference presentations, college communications (i.e., newsletters), professional development activities, delivery of professional development activities to junior faculty by senior faculty, and "extra credit" given on annual evaluations. What is key to note about this finding is, in most cases, the greatest motivator was not monetary in nature but came in the form of support from administration.

Support for models of curriculum integration is strong. This comes across through each of the three community colleges as well as through the cohort students of the CCL Teaching and Learning course. As a result of the cohort class, CCL faculty are being asked to provide presentations on the learning college, curriculum integration, and learning styles as part of the various fall professional development activities at community colleges. Cohort students are inquiring about high school and community college sites where they can go and observe curriculum integration practices at work. Community college administration and personnel are excited about the teaching and learning specialty of the CCL program at UIUC and are willing to provide input into such a program. While there is a long way to go in terms of shifting community colleges from being primarily teaching centered to learning or student centered, it is clear from this study that there are individuals within the Illinois community college system who are willing to champion the cause.

Implications from the Initiatives

What have we learned from these three initiatives? Do they have implications for others who are planning to reform their teacher education programs? Perhaps these questions can begin to be answered by examining the concept of organizational change. Wagner (1998) noted that

> [m]ost approaches to systematic education reform are rooted in obsolete, top-down or expert-driven management beliefs and practices that reflect neither what we know about how people learn nor what we have come to understand about how organizations change. (p. 512)

Wagner's (1998) statement captures the essence of a process that many public schools, community colleges, and universities have traditionally followed whenever it seems to be an appropriate time to "reform" education. Fortunately, for many educational institutions, change has evolved into a process that is much more productive and rewarding. This process is what Wagner refers to as collaborative inquiry. Such a process engages stakeholders in collaboration rather than compliance. Collaborative inquiry promotes a climate in which people become engaged in understanding the need for change, actively study the change and decide how it will occur, and then participate in implementing the change. Osguthorpe (1999, pp. 16-18) offers a comprehensive model for individual and organizational renewal that aligns with Wagner's views and builds on contemporary collaboration and inquiry literature. In this model, collaborative reflection serves as the starting point for establishing a culture of inquiry, and the culture of inquiry provides a foundation for both individual and organizational renewal. Included in the model are nine ways that collaborative reflection can be stimulated: (1) build trust, (2) make time, (3) nurture questions, (4) form groups, (5) take risks, (6) be patient, (7) give gifts, (8) accept offerings, and (9) recognize results. This wide range of approaches can assist in organizing a culture of inquiry and establishing meaningful individual and organizational renewal.

Connections with Organizational Renewal

To what extent do the teacher education initiatives align with contemporary views of organizational renewal? Actually, the three initiatives seem to align quite well. This alignment is described within the context of three aspects of organizational renewal: (1) collaborative reflection, (2) culture of inquiry, and (3) individual and organizational renewal.

Collaborative Reflection

In their own way, each of the initiatives involved a wide range of stakeholders in collaborative reflection. At a 1998 conference sponsored by Virginia Tech project staff, university teacher educators, preservice teachers, and practicing teachers and administrators in the schools were afforded an opportunity to meet together, share concerns about the schools and teacher education, and establish a more meaningful direction for change in university teacher education. The outcomes of this conference served as a foundation for work conducted during 1999. At UC Berkeley, part of the 1998 Initiative agenda focused on bringing university teacher educators and teachers from local career academies together to discuss academy teaching issues and explore collaboratively the activities that might be included in preservice teacher education to better meet the needs of the schools. This list of potential activities formed the basis for UC Berkeley's 1999 agenda. At UIUC, concerns about the preparation of community college instructors led to a collaboration with three community colleges that were actively engaged in curriculum and instructional reform. Through focus groups conducted with faculty members and administrators at these institutions, valuable information about current and future community college instructor needs was obtained. Much of the information gathered was incorporated into a program for community college educators and is already having direct impact on how instructors are prepared.

The initiatives have also maintained their collaborative relationships with stakeholders. Educators from outside the universities continue to be involved in collaborative reflection with university faculty. For example, at UC Berkeley, a series of workshops for student teachers are being presented during the fall of 1999 by a team of career academy teachers. The workshops were designed collaboratively by academy teachers and teacher education staff at UC Berkeley. At UIUC, a meeting during the fall of 1999 provided an opportunity to gain more insight into trends in community college teaching and learning as well as the professional development needs of persons seeking careers in community college teaching. Participating in this collaborative meeting were community college instructors, supervisors, and administrators as well as a representative from the Illinois Community College Board. Virginia Tech initiative staff have scheduled a meeting for the fall of 1999 that will bring together university teacher educators, school administrators, and teachers to reflect on past collaboration and make plans for collaboration in the future. Many of the ways that collaborative reflection can be stimulated have incorporated in the initiatives' activities (Osguthorpe, 1999; Osguthorpe & Patterson, 1998). Examples include building trust, making time to collaborate, nurturing questions, forming groups, and taking risks. Additionally, the patience displayed by collaborators reflects a perception that reforming teacher education cannot

be accomplished overnight. It is viewed as a long-term initiative—one that cannot be rushed.

Culture of Inquiry

The initiatives appeared to incorporate cultures of inquiry into their efforts. Building cultures of inquiry into the three reform agendas may have been stimulated by the strong commitment of the research universities to conducting disciplined inquiry. A culture of inquiry could be seen at UIUC where community college focus group results were incorporated into a course for community college educators. In this instance, there was not only concern about the revised course's process (e.g., how it was organized and flowed) but outcomes (e.g., how students reacted to the course and how what they learned was applied to community college settings). Inquiry was also noted at Virginia Tech where teams of educators—teacher educators, teachers, and student teachers—collaborated to determine the best ways of integrating academic and vocational studies in different school subjects and settings. At UC Berkeley, a culture of inquiry was established through testing several approaches to providing student teachers with experiences in workplaces and schools. Feedback from students who participated in these experiences helped to guide future decisions about the approaches.

Individual and Organizational Renewal

Renewal is typically viewed as a long-term process, often extending from three to five years and sometimes for the life of a program or curriculum. It is therefore difficult, if not impossible, to determine whether the initiatives described here have resulted in individual and organizational renewal. There is, however, some indication that the three initiatives are moving in the right direction. Evidence that university teacher educators and educators in schools and community colleges are working together in collaborative and reflective ways supports the notion that teacher education renewal is moving forward. Likewise, inquiry processes incorporated into the initiatives include active participation and involvement from school and community college educators. This is a major shift from the way change has occurred traditionally in teacher education programs. A revolutionary shift such as this is just what may be needed to stimulate real renewal in teacher education at the university level.

Several Suggestions for Teacher Education Reform

Based on what we have learned from these three teacher education initiatives, several suggestions are offered for planning and conducting teacher education reform:

- **Expect and plan for a large, complex reform process.** Teacher education reform may start off small but it should eventually involve most if not all of the faculty, students, school and community college educators, and other stakeholders if both individual and organizational renewal is to occur.
- **Organize for change in the long term.** Renewal is typically not a short-term proposition, so planning should extend out three to five years or beyond.
- **Involve stakeholders as collaborating, contributing partners.** Active collaboration among faculty members and between the university and the schools is central to the success of teacher education reform.
- **Establish stakeholder ownership in the reform.** Collaborative reflection is a powerful tool to assist in establishing this ownership.
- **Provide stakeholders with opportunities to engage in inquiry.** This may be most beneficial if conducted by groups or teams.
- **Employ team building processes throughout the reform process.** Teaming can engage a wide range of educators and others in meaningful collaboration and inquiry.

Persons who are exploring whether to reform their teacher education programs should keep in mind that these suggestions are based for the most part on the short-term experiences of the three initiatives. Hopefully, as these initiatives continue to expand and gain momentum, they will be revisited and the longer-term impact of their creative efforts can be documented.

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